I claim:

1. Optical telecommunications system, comprising:

(a) a station (1) for transmitting optical signals, comprising a transmission signals generator (2), capable of generating at least two signals at wavelengths lying within a band of predetermined width, and a multiplexer (3) of the said optical signals;

(b) a station (8) for receiving the said optical signals;

(c) an optical fibre line connecting the said multiplexer of the transmission station to the said receiving station;

(d) the said optical fibre line including at least one optical amplifier (7) comprising at least one fibre (12) doped with a rare earth, at least one source of pumping radiation (14) for the said doped fibre, and a gain stabilization circuit, characterized in that the said gain stabilization circuit includes:

(i) a separator of the transmission signals from the spontaneous emission of the amplifier, connected after the said doped fibre and capable of sending the said transmission signals to one output of the amplifier and the said spontaneous emission to a further output;

(ii) a loop circuit for the re-circulation of the said spontaneous emission collected from the said further output and re-injected before the said doped fibre of the amplifier.

2. Optical telecommunications system according to Claim 1, characterized in that the said signal separator comprises an optical circulator (17), connected after the doped fibre (12) of the amplifier by a connecting fibre (17a) and to the output port (18) of the amplifier by a connecting fibre (17c) opposite to the previous one, and having an intermediate connecting fibre (17b) connected to a selective reflection filtering station which reflects along the said fibre the signals having wavelengths equal to those of the transmission signals and sends the remaining radiation to the said loop circuit.

3. Optical telecommunications system according to Claim 1, characterized in that the said loop circuit comprises a length of optical fibre (19) having one end connected

to the output of the said filtering station and the other end connected, through a coupler (21), before the doped fibre (12) of the amplifier.

4. Optical telecommunications system according to claim 3, characterized in that the said loop circuit comprises a variable attenuator (23) connected along the length of optical fibre (19).

5. Optical telecommunications system according to Claim 2, characterized in that the said filtering station comprises at least one selective reflection filter (22), tuned to one or more wavelengths of the said at least two transmission signals.

6. Optical amplifier (7) comprising:
an input port for an optical signal to be amplified;
at least one fibre (12) doped with a rare earth;
at least one source of pumping radiation (14) for the said doped fibre;
an output port for an amplified signal; and
a gain stabilization circuit, characterized in that the said gain stabilization circuit includes:

(i) a separator of the amplified signal from the spontaneous emission of the amplifier, connected after the said doped fibre and capable of sending the said transmission signal to the output port of the amplifier and sending the said spontaneous emission to a further output; and

(ii) a loop circuit for re-circulating the said spontaneous emission collected from the said further output and re-injected before the said doped fibre of the amplifier.

7. Amplifier according to Claim 6, characterized in that the said signal separator comprises an optical circulator (17), connected after the doped fibre (12) of the amplifier by a connecting fibre (17a) and to the output port (18) of the amplifier by a connecting fibre (17c) opposite to the previous one, and having an intermediate connecting fibre (17b) connected to a selective reflection filtering station which reflects

the signals having wavelengths equal to those of the transmission signals to the said intermediate connecting fibre, and sends the remaining radiation to the said loop circuit.

8. Amplifier according to Claim 6, characterized in that the said loop circuit comprises a length of optical fibre (19) having one end connected to the output of the said filtering station and the other end connected, through a coupler (21), before the doped fibre (12) of the amplifier.

9. Amplifier according to Claim 8, characterized in that the said loop circuit comprises a variable attenuator (23) connected along the length of fibre (19).

10. Amplifier according to Claim 7, characterized in that the said filtering station comprises at least one selective reflection filter (22), tuned to the wavelength of the said signal to be amplified.

11. Optical telecommunications method comprising the stages of:

(a) generating at least two optical transmission signals, at predetermined wavelengths which are different from each other;

(b) multiplexing the said optical signals in a single transmission line, forming a multiple-wavelength optical signal comprising the said optical transmission signals;

(c) transmitting the said multiple-wavelength optical signal by means of the transmission line;

(d) amplifying the said optical signal along the transmission line by means of at least one optical amplifier located along the line;

(e) sending the said optical signal to a receiving station comprising at least one receiver, characterized in that the said stage of amplifying the said optical signal includes the stages of:

(i) sending the optical signal received from the line to the input of the amplifier;

(ii) separating the amplified optical signal from the spontaneous emission of the amplifier at the output of the amplifier;

(iii) sending the said spontaneous emission back to the input of the amplifier;

(iv) sending the said amplified optical signal to the line.

12. Method according to Claim 11, characterized in that the said stage of separating the amplified optical signal from the spontaneous emission of the amplifier at the output of the amplifier comprises the stages of:

(a) selectively reflecting the radiation having a wavelength corresponding to that of the said optical signals;

(b) sending this reflected radiation to the output of the amplifier.

13. Method according to Claim 12, characterized in that the said stage of sending the said spontaneous emission back to the input of the amplifier comprises the further stages of:

(a) collecting the portion of non-reflected radiation corresponding to the spontaneous emission of the amplifier;

(b) attenuating this portion of radiation; and

(c) coupling this attenuated portion of radiation to the input of the amplifier.

14. Method for stabilizing the gain of an optical amplifier, comprising the following stages:

(a) sending an optical signal to the input of the amplifier;

(b) sending the said optical signal, when amplified, to the output of the amplifier, characterized in that it comprises the stages of:

(c) separating the amplified optical signal from the spontaneous emission of the amplifier at the output of the amplifier; and

(d) sending the said spontaneous emission back to the input of the amplifier.